

Appl. No. 10/528,961

Reply to Office Action of October 15, 2007

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Withdrawn) An electrical circuit comprising a substrate having thereon a receptive layer, wherein the receptive layer has a conductive polymer impregnated in the receptive layer.

2. (Withdrawn) The electrical circuit of claim 1, further comprising a terminal made of an electrical conductor or a semiconductor on the substrate, the receptive layer being adjacent to the terminal, whereby the conductive polymer is electrically connected with the terminal so as to form at least a part of the electrical circuit.

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3. (Withdrawn) The electrical circuit of claim 1,

wherein:

the conductive polymer is an oligomer having a repeat number of 4 to 19 or a polymer having a repeat number of 20 or more; and

the conductive polymer has a repeat unit of thiophene, vinylene, thienylene vinylene, phenylene vinylene, p-phenylene or substituent compounds thereof.

4. (Withdrawn) The electrical circuit of claim 3, wherein the conductive polymer is an oligomer or a polymer having thiophene or substituted thiophene as the repeat unit.

5. (Withdrawn) The electrical circuit of claim 3, wherein the oligomer or the polymer contains a dopant.

6. (Withdrawn) The electrical circuit of claim 4, wherein the oligomer or the polymer contains a dopant.

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7. (Withdrawn) The electrical circuit of claim 1, wherein an electrical conductivity of the conductive polymer is 0.01 S/cm or more.

8. (Withdrawn) The electrical circuit of claim 7, wherein the electrical conductivity of the conductive polymer is 1 S/cm or more.

9. (Withdrawn) The electrical circuit of claim 1, wherein the receptive layer is porous.

10. (Withdrawn) The electrical circuit of claim 9, wherein the receptive layer contains inorganic particles.

11. (Withdrawn) The electrical circuit of claim 10, wherein the inorganic particles are silica particles prepared by a vapor deposition method.

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12. (Withdrawn) The electrical circuit of claim 10, wherein an average particle diameter of the inorganic particles is 0.003 to 0.2  $\mu\text{m}$ .

13. (Withdrawn) The electrical circuit of claim 12, wherein the average particle diameter of the inorganic particles is 0.005 to 0.1  $\mu\text{m}$ .

14. (Withdrawn) The electrical circuit of claim 10, wherein:  
the receptive layer further contains a hydrophilic binder;  
and  
a weight ratio of the inorganic particles to the hydrophilic binder is between 2 : 1 and 20 : 1.

15. (Withdrawn) The electrical circuit of claim 1, wherein the substrate is a polymer.

16. (Withdrawn) A thin film transistor comprising a substrate having thereon:

a semiconductor layer;

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a receptive layer adjacent to the semiconductor layer;

a gate electrode; and

a gate insulator layer provided:

between the receptive layer and the gate electrode; and

between the semiconductor layer and the gate electrode,

wherein the receptive layer comprises:

a source electrode made of a conductive polymer impregnated in the receptive layer; and

a drain electrode made of the conductive polymer impregnated in the receptive layer,

the source electrode and the drain electrode each being in contact with the semiconductor layer.

17. (Withdrawn) The thin film transistor of claim 16,

wherein:

the conductive polymer is an oligomer having a repeat number of 4 to 19 or a polymer having a repeat number of 20 or more; and

the conductive polymer has a repeat unit of thiophene, vinylene, thienylene vinylene, phenylene vinylene, p-phenylene or substituent compounds thereof.

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18. (Withdrawn) The thin film transistor of claim 17, wherein the conductive polymer is an oligomer or a polymer having thiophene or substituted thiophene as a repeat unit.

19. (Withdrawn) The thin film transistor of claim 17, wherein the oligomer or the polymer contains a dopant.

20. (Withdrawn) The thin film transistor of claim 16, wherein an electrical conductivity of the conductive polymer is 0.01 S/cm or more.

21. (Withdrawn) The thin film transistor of claim 20, wherein the electrical conductivity of the conductive polymer is 1 S/cm or more.

22. (Withdrawn) The thin film transistor of claim 16, wherein the receptive layer is porous.

23. (Withdrawn) The thin film transistor of claim 22, wherein the receptive layer contains inorganic particles.

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24. (Withdrawn) The thin film transistor of claim 23, wherein the inorganic particles are silica particles prepared by a vapor deposition method.

25. (Withdrawn) The thin film transistor of claim 24, wherein an average particle diameter of the inorganic particles is 0.003 to 0.2  $\mu\text{m}$ .

26. (Withdrawn) The thin film transistor of claim 25, wherein the average particle diameter of the inorganic particles is 0.005 to 0.1  $\mu\text{m}$ .

27. (Withdrawn) The thin film transistor of claim 26, wherein:  
the receptive layer further contains a hydrophilic binder;  
and  
a weight ratio of the inorganic particles to the hydrophilic binder is between 2 : 1 and 20 : 1.

28. (Withdrawn) The electrical circuit of claim 16, wherein the substrate is a polymer.

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**29. (Currently Amended)** A method for manufacturing an electrical circuit comprising a step of forming at least a part of the electrical circuit by impregnating a  $\pi$ -conjugated conductive polymer in a receptive layer.

**30. (Original)** The method for manufacturing the part of the electrical circuit of claim 29, comprising the steps of:

impregnating a solution or a dispersed liquid containing the conductive polymer in the receptive layer; and

forming the part of the electrical circuit by evaporating a solvent of a solution containing the conductive polymer or a dispersant of a dispersed liquid containing the conductive polymer.

**31. (Original)** The method for manufacturing the electrical circuit of claim 30, wherein the solvent of the solution containing the conductive polymer or the dispersant of the dispersed liquid containing the conductive polymer contains 30 % or more of water.



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**32. (Original)** The method for manufacturing the electrical circuit of claim 30, wherein the solvent of the solution containing the conductive polymer or the dispersant of the dispersed liquid containing the conductive polymer contains 5 to 70 % by weight of a water soluble organic solvent.

**33. (Original)** The method for manufacturing the electrical circuit of claim 32, wherein the solvent of the solution containing the conductive polymer or the dispersant of the dispersed liquid containing the conductive polymer contains 10 to 30 % by weight of a water soluble organic solvent.

**34. (Original)** The method for manufacturing the electrical circuit of claim 30, wherein the solution or the dispersed liquid containing the conductive polymer has 0.001 to 1 % by weight of a surfactant.

**35. (Currently amended)** The method for manufacturing the electrical circuit of claim 34, wherein the surfactant is a ~~nonion~~ non-ionic surfactant.

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**36. (Original)** The method for manufacturing the electrical circuit of claim 29, wherein the part of the electrical circuit is formed by ejecting the conductive polymer onto the receptive layer by a ink-jet printing method so as to impregnate the ejected conductive polymer in the receptive layer.

**37. (Original)** The method for manufacturing the electrical circuit of claim 30, wherein the solution or the dispersed liquid containing the conductive polymer is impregnated in the receptive layer by ejecting the solution or the dispersed liquid containing the conductive polymer onto the receptive layer by a ink-jet printing method.

**38. (Original)** The method for manufacturing the electrical circuit of claim 36, wherein an amount of the conductive polymer impregnated in the receptive layer is controlled by controlling an amount of the ejected conductive polymer per unit area.

**39. (Original)** The method for manufacturing the electrical circuit of claim 37, wherein an amount of the conductive polymer impregnated in the receptive layer is controlled by controlling

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an amount of the ejected solution or the dispersed liquid containing the conductive polymer per unit area.

**40. (Previously presented)** The method for manufacturing the electrical circuit of claim 29,

wherein:

the conductive polymer is an oligomer having a repeat number of 4 to 19 or a polymer having a repeat number of 20 or more; and

the conductive polymer has a repeat unit of thiophene, vinylene, thienylene vinylene, phenylene vinylene, p-phenylene or a substituent compound thereof.

**41. (Original)** The method for manufacturing the electrical circuit of claim 40, wherein the conductive polymer is an oligomer or a polymer having thiophene or substituted thiophene as a repeat unit.

**42. (Original)** The method for manufacturing the electrical circuit of claim 40, wherein the oligomer or the polymer contains a dopant.

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**43. (Previously presented)** The method for manufacturing the electrical circuit of claim 29, wherein an electrical conductivity of the conductive polymer is 0.01 S/cm or more.

**44. (Original)** The method for manufacturing the electrical circuit of claim 43, wherein the electrical conductivity of the conductive polymer is 1 S/cm or more.

**45. (Previously presented)** The method for manufacturing the electrical circuit of claim 29, wherein the receptive layer is porous.

**46. (Original)** The method for manufacturing the electrical circuit of claim 45, wherein the receptive layer contains inorganic particles.

**47. (Original)** The method for manufacturing the electrical circuit of claim 46, wherein the inorganic particles are silica particles prepared by a vapor deposition method.

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**48. (Original)** The method for manufacturing the electrical circuit of claim 46, wherein an average particle diameter of the inorganic particles is 0.003 to 0.2  $\mu\text{m}$ .

**49. (Original)** The method for manufacturing the electrical circuit of claim 48, wherein the average particle diameter of the inorganic particles is 0.005 to 0.1  $\mu\text{m}$ .

**50. (Original)** The method for manufacturing the electrical circuit of claim 46, wherein:

the receptive layer further contains a hydrophilic binder;  
and a weight ratio of the inorganic particles to the hydrophilic binder is between 2 : 1 and 20 : 1.

**51. (Previously presented)** The method for manufacturing the electrical circuit of claim 29, wherein the substrate is a polymer.

**52. (Withdrawn)** A method for manufacturing a thin film transistor comprising the steps of:

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forming a semiconductor layer on a substrate;

forming a receptive layer adjacent to the semiconductor layer;

forming a source electrode in the receptive layer being in contact with the semiconductor layer by impregnating a conductive polymer in the receptive layer;

forming a drain electrode in the receptive layer being in contact with the semiconductor layer by impregnating the conductive polymer in the receptive layer;

forming a gate electrode; and

forming a gate insulator layer:

between the semiconductor layer and the gate electrode;

and

between the receptive layer and the gate electrode.

53. (Withdrawn) The method for manufacturing the thin film transistor of claim 52, comprising the steps of:

impregnating a solution or a dispersed liquid containing the conductive polymer in the receptive layer; and

forming the source electrode and the drain electrode by evaporating a solvent of the solution containing the conductive

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polymer or a dispersant of the dispersed liquid containing the conductive polymer.

54. (Withdrawn) The method for manufacturing the thin film transistor of claim 53, wherein the solvent of the solution containing the conductive polymer or the dispersant of the dispersed liquid containing the conductive polymer contains 30 % or more of water.

55. (Withdrawn) The method for manufacturing the thin film transistor of claim 53, wherein the solvent of the solution containing the conductive polymer or the dispersant of the dispersed liquid containing the conductive polymer contains 5 to 70 % by weight of a water soluble organic solvent.

56. (Withdrawn) The method for manufacturing the thin film transistor of claim 55, wherein the solvent of the solution containing the conductive polymer or the dispersant of the dispersed liquid containing the conductive polymer contains 10 to 30 % by weight of a water soluble organic solvent.

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57. (Withdrawn) The method for manufacturing the thin film transistor of claim 53, wherein the solution or the dispersed liquid containing the conductive polymer contains 0.001 to 1 % by weight of a surfactant. 58. (Withdrawn) The method for manufacturing the thin film transistor of claim 57, wherein the surfactant is a nonion surfactant.

58. (Withdrawn) The method for manufacturing the thin film transistor of Claim 57, wherein the surfactant is a nonion surfactant.

59. (Withdrawn) The method for manufacturing the thin film transistor of claim 52, wherein the source electrode and the drain electrode are formed by ejecting the conductive polymer onto the receptive layer by a ink-jet printing method so as to impregnate the ejected conductive polymer in the receptive layer.

60. (Withdrawn) The method for manufacturing the thin film transistor of claim 53, wherein the solution or the dispersed liquid containing the conductive polymer is impregnated in the receptive layer by ejecting the solution or the dispersed liquid



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containing the conductive polymer onto the receptive layer by a ink-jet printing method.

61. (Withdrawn) The method for manufacturing the thin film transistor of claim 59, wherein an amount of the conductive polymer impregnated in the receptive layer is controlled by controlling an amount of the ejected conductive polymer per unit area.

62. (Withdrawn) The method for manufacturing the thin film transistor of claim 60, wherein an amount of the conductive polymer impregnated in the receptive layer is controlled by controlling an amount of the ejected solution or the dispersed liquid containing the conductive polymer per unit area.

63. (Withdrawn) The method for manufacturing the thin film transistor of claim 52,

wherein:

the conductive polymer is an oligomer of which a repeat number is 4 to 19 or a polymer of which a repeat number is 20 or more; and

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the conductive polymer has a repeat unit of thiophene, vinylene, thienylene vinylene, phenylene vinylene, p-phenylene or substituent compounds thereof.

64. (Withdrawn) The method for manufacturing the thin film transistor of claim 63, wherein the conductive polymer is an oligomer or a polymer having thiophene or substituted thiophene as a repeat unit.

65. (Withdrawn) The method for manufacturing the thin film transistor of claim 63, wherein the oligomer or the polymer contains a dopant.

66. (Withdrawn) The method for manufacturing the thin film transistor of claims 52, wherein an electrical conductivity of the conductive polymer is 0.01 S/cm or more.

67. (Withdrawn) The method for manufacturing the thin film transistor of claim 66, wherein the electrical conductivity of the conductive polymer is 1 S/cm or more.

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68. (Withdrawn) The method for manufacturing the thin film transistor of claims 52, wherein the receptive layer is porous.

69. (Withdrawn) The method for manufacturing the thin film transistor of claim 68, wherein the receptive layer contains inorganic particles.

70. (Withdrawn) The method for manufacturing the thin film transistor of claim 69, wherein the inorganic particles are silica particles prepared by a vapor deposition method.

71. (Withdrawn) The method for manufacturing the thin film transistor of claim 69, wherein an average particle diameter of the inorganic particles is 0.003 to 0.2  $\mu\text{m}$ .

72. (Withdrawn) The method for manufacturing the thin film transistor of claim 71, wherein the average particle diameter of the inorganic particles is 0.005 to 0.1  $\mu\text{m}$ .

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73. (Withdrawn) The method for manufacturing the thin film transistor of claim 69, wherein:

the receptive layer further contains a hydrophilic binder;  
and

a weight ratio of the inorganic particles to the hydrophilic binder is between 2 : 1 and 20 : 1.

74. (withdrawn) The method for manufacturing the thin film transistor of claims 52, wherein the substrate is a polymer.